Annual Report to the Twenty-Second Legislature
Regular Session of 2003

NORTH SHORE PAUKAUILA STREAMBANK EROSION AND RIPARIAN AREA COMMUNITY PROJECT

Prepared by the

Department of Land and Natural Resources
State of Hawaii

in response to
Senate Concurrent Resolution 223, Senate Draft 1, Regular Session of 1995

December 2002

Fiscal Year 2001-2002
Annual Report on North Shore Paukauila Streambank Erosion
& Riparian Area Community Restoration Project

This annual report is prepared pursuant to Senate Concurrent Resolution 223, Senate Draft 1, Regular Session of 1995, and covers the period July 1, 2001 through June 30, 2002.

This concurrent resolution requests the Department of Land and Natural Resources Flood Control Section to assist the Paukauila Streambank and Riparian Area Community Restoration Project by providing information, expertise, and support in their efforts to coordinate and maintain the Paukauila Streambank, and to report its findings and accomplishments to the Legislature on a yearly basis.

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1.0 INTRODUCTION

Senate Concurrent Resolution (SCR) No. 223, Senate Draft (SD) 1 of the Eighteenth Legislature, 1995 (See Appendix A) requested that the Department of Land and Natural Resources (DLNR) coordinate with the Paukauila Streambank and Riparian Area Community Restoration Project (PSP) by providing information, expertise, and support; and to coordinate with the City and County of Honolulu, Department of Public Works; Department of Health Environmental Planning Office and Clean Water Branch; the United States Army Corps of Engineers, and the United States Department of Agriculture, Natural Resources Conservation Service in conjunction with the West Oahu Soil and Water Conservation District to recommend a restoration plan and implement the recommendations.

The PSP Ad-hoc Committee did not formally meet as a group this past year to discuss the issues of hazard mitigation for the Paukauila Streambank and Riparian Area Community Restoration Project.

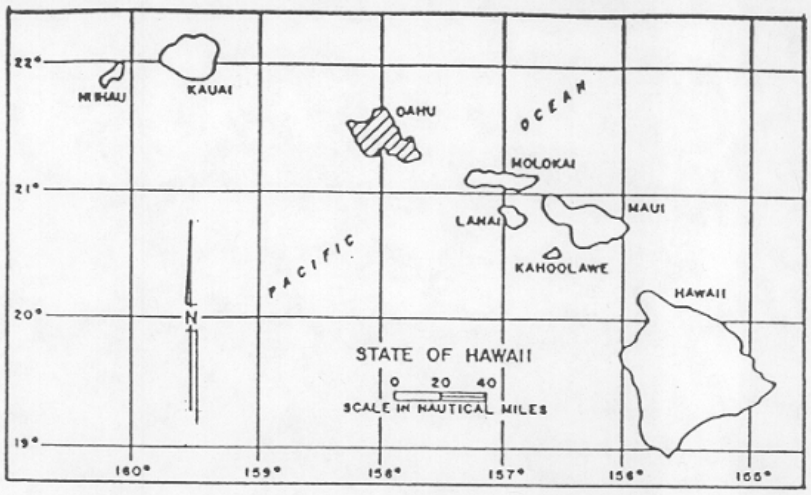
This report is to be regarded as general information in nature. It is not to be construed as approval by the State or other government agencies for specific proposed solutions and actions.

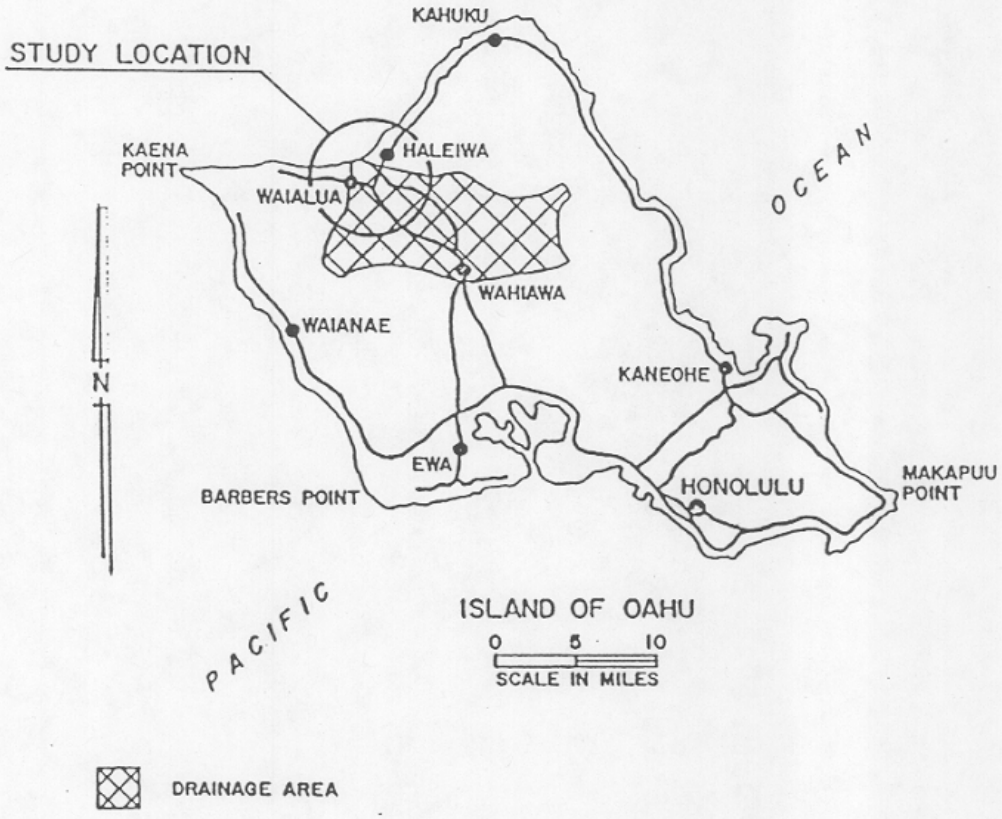
2.0 BACKGROUND AND FLOODING PROBLEM

2.1 Description

The Paukauila-Kiikii Stream drainage basin is the largest basin on the Island of Oahu (Figure 1). The basin ranges from approximately 2000 feet mean sea level (msl) at the crest of the Koolau Mountain Range to approximately 10± feet msl at Cane Haul Road Bridge. The Paukauila-Kiikii Stream and its tributary streams are located on the northwestern coast of Oahu (Figure 2). Paukauila and Kiikii Streams converge at Cane Haul Road Bridge just prior to discharging into Kaiaka Bay. Kiikii Stream has two main tributaries, Kaukonahua and Poamoho Streams. Tributaries to the Paukauila branch are Helemano and Opaeula Streams. Poamoho, Kaukonahua, Opaeula and Helemano Streams are typically perennial in the upper reaches, while the middle reaches are intermittent caused primarily by diversions for irrigation use. The stream waters are stored in more than 30 small reservoirs and a relatively large one (Wahiawa Reservoir with a 9,200 acre-foot capacity) along the tributaries. Since these reservoirs were constructed for irrigation purposes, they were not designed for flood control storage.

The main streams are under tidal influence up to their confluence with the tributaries, and have a relatively gradual slope and low velocity flow during normal conditions.

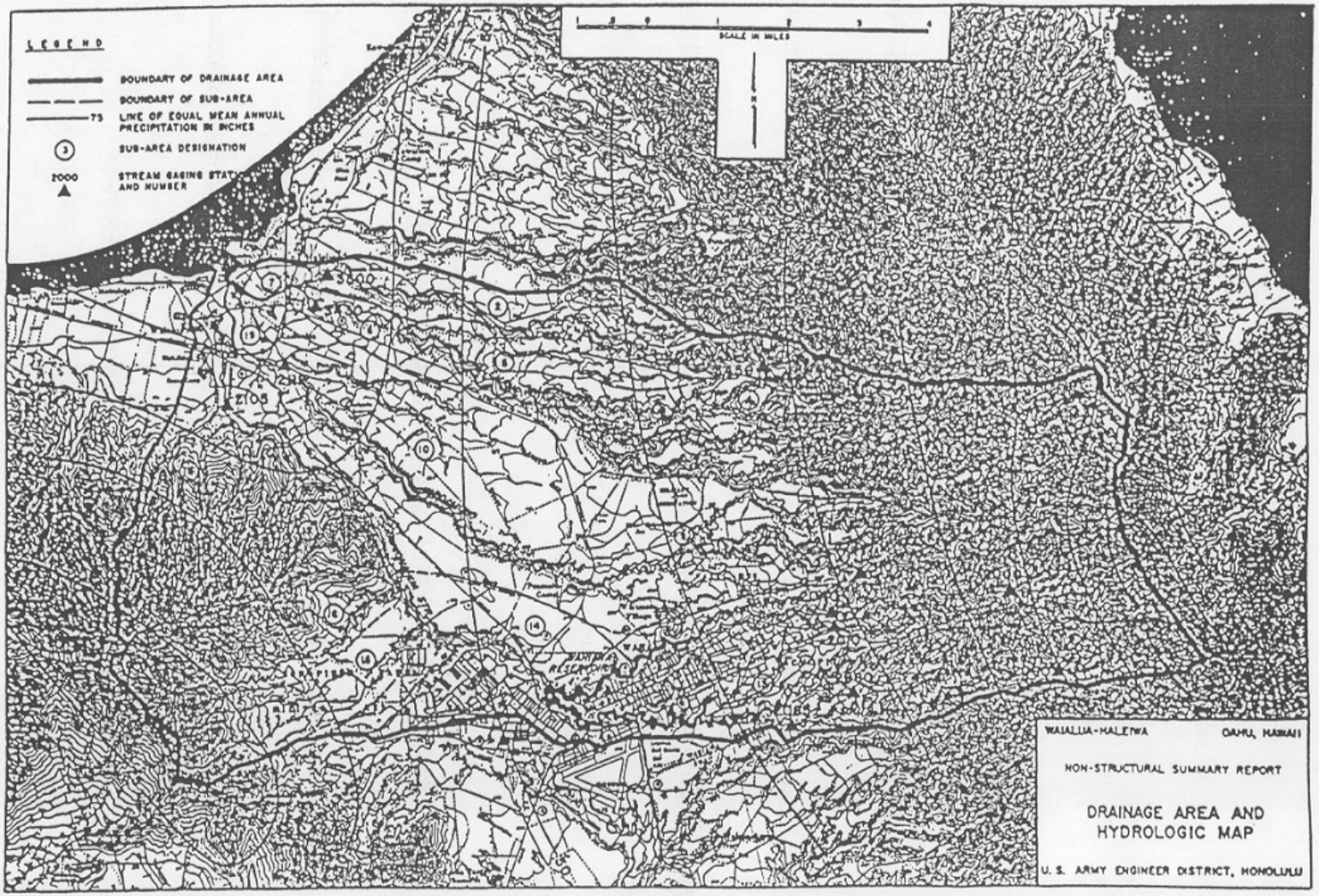




Source: *Non-Structural Summary Report for Flood Damage Reduction, WAIALUA-HALEIWA AREA, Oahu, Hawaii*, Department of the Army, U.S. Army Engineer District, Honolulu, September 1976.

Figure 1
Location Map

North Shore Paukauila Streambank Erosion
and Riparian Area Community Project
Prepared by: Department of Land and Natural Resources



Note: Drawing not to scale

Source: *Non-Structural Summary Report for Flood Damage Reduction, WAIALUA-HALEIWA AREA, Oahu, Hawaii,* Department of the Army, U.S. Army Engineer District, Honolulu, September 1976.

Figure 2

DRAINAGE MAP

North Shore Paukauila Streambank Erosion
and Riparian Area Community Project
Prepared by: Department of Land and Natural Resources

2.2 Flood Problem

Most floods in Hawaii result from large scale storm systems and occur generally from November through May. However, flooding from intense local thunderstorms can occur any time. The basin topography and existing drainage way capacities are such that flooding in the Waialua-Haleiwa area is restricted entirely to the low-lying area between elevation 30 and the Pacific Ocean (Figure 3). Flooding is attributed primarily to the inadequate capacity of the existing streams, particularly Paukauila and Kiikii Streams. During high-peak discharges, flood waters overtop the streambanks, inundating the low-lying residential and agricultural lands. Erosion, sedimentation, and waterborne debris also compound the flood problem. Blockage of bridge openings by debris restricts flow, causing flood waters to back up and inundate low-lying areas.

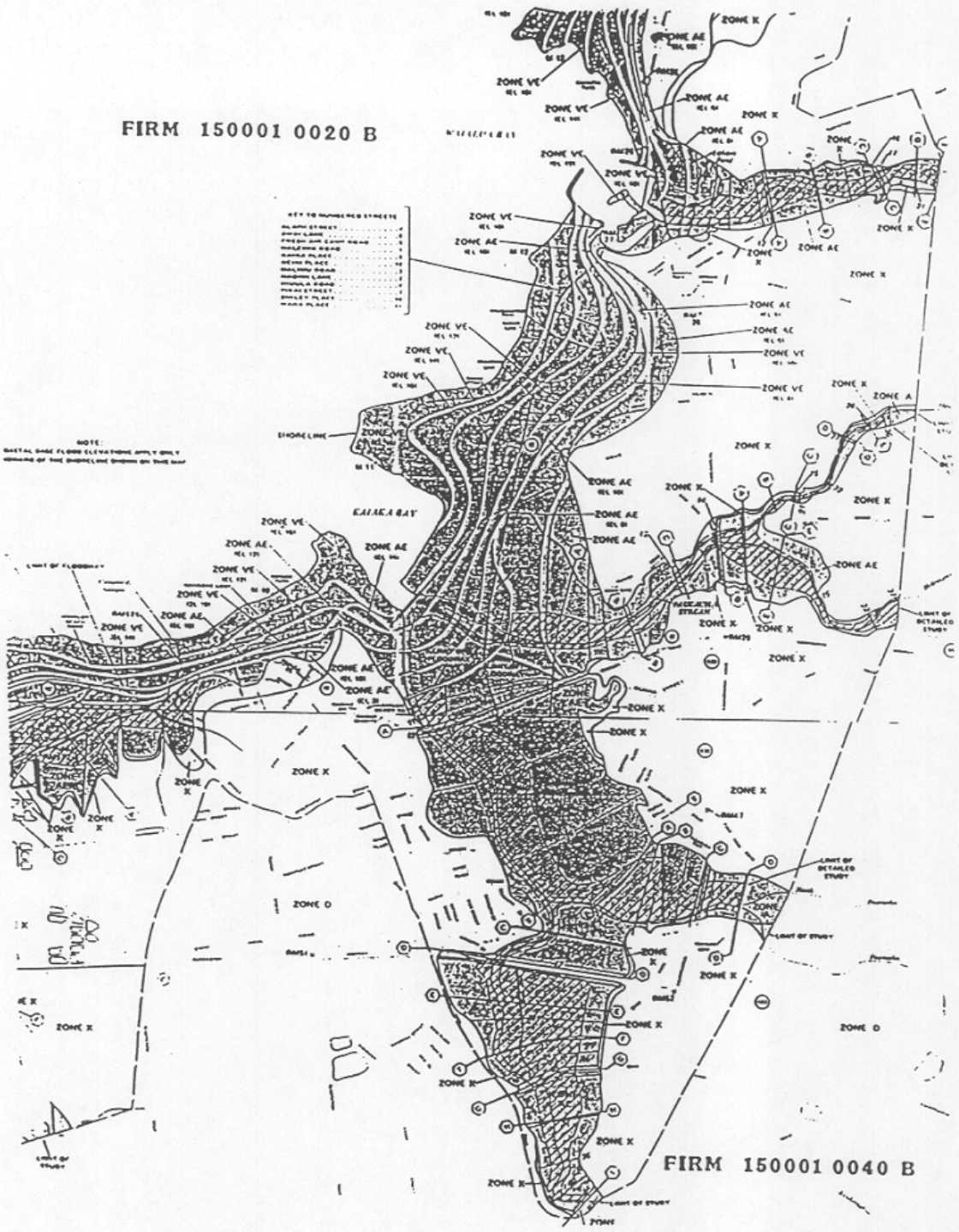
2.3 Flood History

The Waialua-Haleiwa area has been subjected to flooding from rainstorms, high waves, and tsunamis.

Flooding by Rainstorms. Rainstorm-generated floods have been the most common, widespread, and damaging of the three natural causes. Most rainstorm floods result from large-scale storm systems with intense rainfall generally occurring from November through May.

Flooding by High Waves. Shoreline surf flooding is caused by unusual storm conditions which produce high, wind-generated waves.

Flooding by Tsunami. Tsunamis, known as tidal waves, have also caused extensive flooding and damage along the coastal regions. Tsunamis are also referred to as “seismic sea waves” because of their association with earthquakes. Since 1819, at least 39 tsunamis are known to have reached the Hawaiian Islands.



Note: Drawing not to scale

Source: *Flood Insurance Rate Map, City and County of Honolulu, Hawaii,* Community Panel Number 150001 0020B and 150001 0040B, Federal Emergency Management Agency, September 4, 1987.

Figure 3
FLOOD INSURANCE RATE MAP

North Shore Paukauila Streambank Erosion
and Riparian Area Community Project
Prepared by: Department of Land and Natural Resources

3.0 CURRENT PROJECTS

The following is a list of current projects which address the issue of flood control for the Waialua-Haleiwa area:

Current Projects (as reported in past legislative reports)	**Project Status**
Paukauila Stream Mouth Dredging Project, DLNR	Dredging completed.
Flood Plain Analysis of Proposed Stream Dredging at Paukauila Stream , U.S. Army Corps of Engineers (USACOE)	Analysis completed. Findings and recommendations are described in a November 1999 report (see below).
Flood Plain Analysis of Kaukonahua Stream, Island of Oahu, U.S. Army Corps of Engineers (USACOE)	Analysis completed. Findings and recommendations are described in a October 2002 report (see below)

The State requested the USACOE investigate the restoration of Kaiaka Bay (Waialua/Wahiawa watershed), Oahu, Hawaii under Section 206, Water Resources Development Act of 1996, Aquatic Ecosystem Restoration Projects Authority. On August 30, 2002, the USACOE indicated that a Section 206 reconnaissance study of restoration opportunities in the Waialua/Wahiawa watershed would be initiated during federal fiscal year 2003. The study's federally-financed preliminary restoration plan will determine whether continued federal interest is warranted in the detailed feasibility phase. Financing for the feasibility phase is 35% non-federal and 65% federal. Once federal interest is determined, a state appropriation will be needed for the detailed feasibility phase for project development to restore the ecosystem of Kaiaka Bay.

4.0 RECOMMENDATIONS

Non-Structural Measures:

Hydrologic/Hydraulic Restudy of Paukauila Stream: According to the USACOE's "Flood Plain Analysis of Proposed Stream Dredging at Paukauila Stream, Island of Oahu" (November 1999), the original Federal Emergency Management Agency (FEMA) hydraulic analysis conducted in 1975 for the Flood Insurance Study is no longer representative of the current topographic conditions. Substantial sedimentation has occurred, thereby increasing the floodplain boundaries and elevations. The report recommends that detailed hydrologic and hydraulic analyses be conducted to determine revised 100-year floodway limits and associated flood elevations based on current conditions.

Flood Plain Analysis of Kaukonahua Stream, Island of Oahu: According to the October 2002 report, dredging and widening a 600-foot length of Kaukonahua Stream would lower the existing water level surface profile by the approximate equivalent of a 5-year event. Dredging would also alleviate the existing flooding problems, providing relief to homes and businesses in the area. Periodic maintenance dredging would be required to maintain carrying capacity. The capacity of the stream near Otake Camp is the approximate equivalent of a 2-year event.

The report recommends that detailed hydrologic and hydraulic analyses be conducted for to determine revised floodplain elevations and floodway limits after dredging is completed. This study should be requested by the City and County of Honolulu to FEMA through the State's Flood Plain Coordinator for the National Flood Insurance Program. The State will submit a request to FEMA for a restudy of Kaukonahua Stream.

Storm Water Drainage Master Plan: Develop a drainage master plan for the Waialua Watershed to determine mitigative measure for erosion and flood protection along Paukauila Stream and its tributaries.

Routine Channel Maintenance: A routine maintenance program for clearing channel debris should be established. The plan should include field inspections after any major flood event. Due to continual sediment deposition from both coastal and riverine processes, dredging of Paukauila-Kiikii Streams should also be conducted on a routine basis.

Enforce Flood Ordinances for All New Development: The City and County of Honolulu shall enforce Article 9 section 21-9.10 for all new development within a flood hazard district.

Flood Plain Zoning: Establish encroachment zones along Opaeula, Helemano, Paukauila, Poamoho, Kaukonahua, and Kiikii Streams and in the tsunami inundation areas to prevent urban development.

Revegetation of Cropped Agricultural Land: Lands once used for sugar cane cultivation are now fallow. Revegetation of this land should be considered in order to minimize sedimentation into the streams.

Public Awareness: Educate the community about the potential for flooding in the area, and inform residents of measures that they can take to minimize the effects of flood damage.

Elevation/Relocation of floodprone structures: Under FEMA's Flood Mitigation Assistance Program, federal funds are available to elevate and relocate

floodprone structures. Program funding is 75% federal and 25% non-federal. Further information can be obtained from the Flood Control & Dam Safety Section, Design, Inspection and Safety Branch, Engineering Division, Department of Land and Natural Resources at 587-0248.

Structural Measures:

Blanketing/Mattressing: A form of soil bioengineering which uses a blanket woven of live green cuttings and biodegradable fiber, geotextile, or wire, laid into a slight excavated depression in the bank, anchored with live or wooden stakes, and often punched through with live stakings. It is then covered with soil and watered repeatedly to fill voids and to facilitate sprouting. Mattresses minimize sediment loading and associated nutrient enrichment impacts downstream by acting as a buffer, disrupting the force of incoming flows, creating turbulence, lowering water velocities, causing deposition of sediment, and protecting banks. These are best used as part of a system which includes a component to deter undercutting at the bank interface, such as riprap or gabions.

Gabions: Gabions were successfully used by residents along Manoa Stream and Kahawai Stream in Waimanalo. Gabions consist of wire cages containing rocks and are installed alongside the stream bank. The gabions prevent flood waters from eroding the stream banks and prevent soils from eroding into the stream. This minimizes sediment loading and associated nutrient enrichment impacts downstream. These gabions are observed to determine whether undercutting at the bank interface is occurring.

5.0 REFERENCES

- *Flood Plain Information-Waialua-Haleiwa, Oahu, Hawaii*, Department of the Army, Pacific Ocean Division, Corps of Engineers, Honolulu, Hawaii, November 1970.

- *Non-Structural Summary Report for Flood Damage Reduction, WAIALUA-HALEIWA AREA, Oahu, Hawaii,* Department of the Army, U.S. Army Engineer District, Honolulu, September 1976.

- *Flood Insurance Rate Map, City and County of Honolulu, Hawaii*, Community Panel Number 150001 0020B and 150001 0040B, Federal Emergency Management Agency, September 4, 1987.

- *Flood Insurance Study, City and County of Honolulu, Hawaii*, Volumes 1-4, Federal Emergency Management Agency, September 30, 1995.

- *Annual Report to the Twentieth Legislature Regular Session of 1998, North Shore Paukauila Streambank Erosion and Riparian Area Community Project*, Department of Land and Natural Resources, December 1997

- *Annual Report to the Twentieth Legislature Regular Session of 1999, North Shore Paukauila Streambank Erosion and Riparian Area Community Project*, Department of Land and Natural Resources, December 1998

- *Flood Plain Analysis of Proposed Stream Dredging at Paukauila Stream, Island of Oahu*, U.S. Army Corps of Engineers, November 1999.

- *Flood Plain Analysis of Kaukonahua Stream, Island of Oahu,* U.S. Army Corps of Engineers, October 2002.

THE SENATE
EIGHTEENTH LEGISLATURE, 1995
STATE OF HAWAII

S.C.R. NO. 223 S.D. 1

SENATE CONCURRENT RESOLUTION

REQUESTING A REVIEW OF THE NORTH SHORE PAUKAUILA STREAMBANK AND RIPARIAN AREA COMMUNITY RESTORATION PROJECT.

WHEREAS, Paukauila stream, which is formed by the convergence of the Helemano and Opaeula streams on the North Shore of Oahu and which leads directly into the Kaiaka Bay, is owned by Kamehameha Schools Bishop Estate and various other parties; and

WHEREAS, the City and County of Honolulu, the Department of Land and Natural Resources Division of Water and Land Development Flood Control Office, and the United States Army Corps of Engineers all have respective jurisdictional responsibilities and commitments to maintain the drainageway and provide for the general welfare and safety of the Paukauila stream area residents; and

WHEREAS, the areas adjacent to Paukauila stream have been urbanized and developed; and

WHEREAS, Paukauila stream is classified as a Class II in-land freshwater body, which means that these waters shall not act as receiving waters for any discharges which have not received the best degree of treatment or control; and Kaiaka Bay is the receiving water body of the Paukauila stream drainage area and has been designated by the Department of Health as a Water Quality Limited Segment, meaning that it continually exceeds state water quality standards due to excessive loading of sediment, nutrients, and microbial pathogens; and

WHEREAS, Kaiaka Bay serves as a critical habitat for endangered marine species and has been shown to contain rich and diverse corralline and microalgae species diversity that are vulnerable to the impacts to streambank erosion; and

WHEREAS, if the problem is unresolved the community will face undue economic and social hardship, continued threats to life, and the water quality of the estuarine and marine habitat of Paukauila stream and Kaiaka Bay will be allowed to further degrade; and

APPENDIX A

WHEREAS, the community, landowners, and county, state, and federal agencies have shown great interest in undertaking streambank restoration activities through the newly formed Paukauila Streambank and Riparian Area Community Restoration Project (PSP) which will coordinate such moneys as necessary; and

WHEREAS, the restoration and maintenance of the Paukauila streambank by the PSP will have a substantial, favorable impact on the North Shore Community and the general public, will preserve and can markedly improve the general health of the stream and the recreational uses of the stream and bay, and will prevent further degradation of Hawaii's freshwater and coastal environments; now, therefore,

BE IT RESOLVED by the Senate of the Eighteenth Legislature of the State of Hawaii, Regular Session of 1995, the House of Representatives concurring, that the Department of Land and Natural Resources Flood Control Branch in coordination with interested North Shore Community Associations, is respectfully requested to assist the PSP by providing information, expertise, and support; and

BE IT FURTHER RESOLVED that the City and County of Honolulu Department of Public Works, the Department of Land and Natural Resources Division of Water and Land Development Flood Control Office, the Department of Health Environmental Planning Office and Clean Water Branch, the United States Army Corps of Engineers, and the United States Department of Agriculture, Natural Resource Conservation Service in conjunction with the West Oahu Soil and Water Conservation District are requested to coordinate efforts to conduct a review and assessment of the PSP problem to prepare and present a report detailing short term and long term remedial actions to correct the problem; and are requested to work with the PSP Ad-hoc Committee to recommend a restoration plan and assist the various government agencies in the implementation of the recommendation; and

BE IT FURTHER RESOLVED that the Department of Land and Natural Resources Division of Water and Land Development Flood Control Office and supporting government agencies are requested to report their findings and accomplishments to the Legislature on a yearly basis, no later than twenty days before the convening of each Regular Session; and

BE IT FURTHER RESOLVED that certified copies of this Concurrent Resolution be transmitted to the Governor, the City and County of Honolulu Director and Chief Engineer of the Department of Public Works, the Director of Health and the Chairperson of the Board of Land and Natural Resources, the Branch Chief of the Corps of Engineers United States Army, Department of Defense, the Commanding General of the 25th Infantry Division (Light), the State Conservationist of the Natural Resources Conservation Service of the United States Department of Agriculture, the Chairperson of the North Shore Neighborhood Board of the City and County of Honolulu Office of Neighborhood Commission Office, and the Chairperson of the Kaiaka-Waialua Bay Hydrologic Unit Area Local Advisory Committee, and the members of Hawaii's congressional delegation.